

Charge Collecting Nanolayers for Perovskite Solar Cells

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All solid-state solar cells based on organometal trihalide perovskite absorbers have already achieved distinguished power conversion efficiency (PCE) to over 15% and further improvements are expected up to 20%.

Efficient charge collection is one of critical issues in perovskite solar cells. The charge collection efficiency for perovskite solar cells can be enhanced by controlling nanostructure or exploiting new materials. In this presentation, we demonstrate that nanostructured materials such as SnO₂@TiO₂ core-shell nanowires and 3D-ITO nanowire/TiO₂nanoparticle materials can facilitate charge transport in perovskite solar cell. Also, MgO nanolayer coated on TiO₂ nanoparticles can efficiently retard charge recombination.

Finally, we introduce highly bendable 12 % perovskite solar cells based on ITO/PEN substrates. The energy conversion efficiency did not change after 1000 cycle of bending test with 10mm bending radius which demonstrates a feasibility of highly bendable perovskite solar cells without efficiency degradation.